

Claims

1. A pressurizing device, comprising:

a fixed part;

an output shaft, inserted in the fixed part and supported slidably in its axial direction, forming a first fluid compartment and a second fluid compartment between itself and the fixed part;

a first piston, formed on the output shaft and dividing the first fluid compartment and the second fluid compartment and having a first connecting hole for connecting the first fluid compartment and the second fluid compartment;

a valve member capable of opening and closing the first connecting hole;

an input shaft, inserted in the output shaft and supported slidably relative to and in the same axial direction as the output shaft and forming a third fluid compartment, connected to the second fluid compartment, between itself and the output shaft; and

a second piston, formed on the input shaft and having a smaller pressurizing area than the first piston, for expanding and contracting the third fluid compartment along with reciprocating movement of the input shaft,

capable of selectively effecting rapid movement of the output shaft by opening the first connecting hole and coupling the input shaft to the output shaft so that relative movement

of the two does not occur and effecting high thrust force pressurization of the output shaft by closing the first connecting hole and allowing relative movement of the input shaft and the output shaft by releasing the connection preventing relative movement of the input shaft and the output shaft,

characterized in that a third through hole extending in the axial direction from the second fluid compartment to outside is formed in the fixed part,

a rod is slidably supported in the third through hole so as to block the third through hole,

the valve member is fixed to one end of the rod and a motive power source mounted outside the fixed part is connected to the other end, and

the first connecting hole is opened and closed by the motive power source operating and advancing and retracting the valve member in the axial direction.

2. A pressurizing device, comprising:

a fixed part;

an output shaft, inserted in the fixed part and supported slidably in its axial direction, forming a first fluid compartment and a second fluid compartment between itself and the fixed part;

a first piston, formed on the output shaft and dividing the first fluid compartment and the second fluid compartment

and having a first connecting hole for connecting the first fluid compartment and the second fluid compartment;

a valve member capable of opening and closing the first connecting hole;

an input shaft, inserted in the output shaft and supported slidably relative to and in the same axial direction as the output shaft and forming a third fluid compartment, connected to the second fluid compartment, between itself and the output shaft; and

a second piston, formed on the input shaft and having a smaller pressurizing area than the first piston, for expanding and contracting the third fluid compartment along with reciprocating movement of the input shaft,

capable of selectively effecting rapid movement of the output shaft by opening the first connecting hole and coupling the input shaft to the output shaft so that relative movement of the two does not occur and effecting high thrust force pressurization of the output shaft by closing the first connecting hole and allowing relative movement of the input shaft and the output shaft by releasing the connection preventing relative movement of the input shaft and the output shaft,

characterized in that a third through hole extending in the axial direction from the second fluid compartment to outside is formed in the fixed part,

a rod is slidably supported in the third through hole so as to block the third through hole,

the valve member is fixed to one of the rod and a motive power source mounted on the output shaft is connected to the other end, and

the first connecting hole is opened and closed by the motive power source operating and advancing and retracting the valve member in the axial direction.

3. A pressurizing device, comprising:

a fixed part having a hollow tubular shape with a first through hole and a second through hole formed in opposite ends of it in a tube axis direction;

an output shaft having a hollow tubular shape slidably supported by the first through hole and the second through hole and forming a first fluid compartment and a second fluid compartment between itself and the fixed part;

a first piston formed integrally with the output shaft and dividing the first fluid compartment and the second fluid compartment and having a first connecting hole for connecting the first fluid compartment and the second fluid compartment;

a valve member capable of opening and closing the first connecting hole;

an input shaft, slidably supported by the output shaft and forming a third fluid compartment, connected to the second fluid compartment, between itself and the output shaft;

a second piston, formed integrally with the input shaft and having a smaller pressurizing area than the first piston, for expanding and contracting the third fluid compartment along with reciprocating movement of the input shaft; and

a pressure-absorbing mechanism for, when the first fluid compartment undergoes high thrust force pressurization by the first piston, relieving the fluid pressure inside the first fluid compartment,

capable of selectively effecting rapid movement of the output shaft by opening the first connecting hole and moving the input shaft with the input shaft and the output shaft in a directly coupled state and effecting high thrust force pressurization of the output shaft by closing the first connecting hole and moving the input shaft with the input shaft and the output shaft in a fluidly coupled state,

characterized in that a third through hole extending in the tube axis direction from the second fluid compartment to outside is formed passing through the fixed part,

a rod is slidably supported in the third through hole so as to block the third through hole,

the valve member is fixed to one of the rod and an advancing and retracting mechanism fixed to the output shaft is connected to the other end, and

the first connecting hole is opened and closed by the advancing and retracting mechanism operating and advancing and

retracting the valve member in the tube axis direction.

4. A pressurizing device according to claim 3, characterized in that the pressure-absorbing mechanism has a chamber whose volume varies in correspondence with its internal pressure connected to the first fluid compartment, and this chamber is mounted outside the fixed part.

5. A pressurizing device according to claim 4, characterized in that the chamber comprises a hollow tubular chamber case, a pressure-absorbing piston slidably supported inside the chamber case, and a measuring device for detecting a sliding distance of the pressure-absorbing piston.

6. A pressurizing device according to claim 5, characterized in that the pressurizing area of the pressure-absorbing piston is the same as the pressurizing area of the first piston.

7. A pressurizing device according to any of claims 1 through 6, characterized in that the rod is exposed so that its operating state is visible from outside.

8. A pressurizing device, comprising:
a fixed part;
an output shaft, supported slidably in its axial direction by the fixed part;
an input shaft, supported by the output shaft movably relative to and in the same axial direction as the output shaft, capable of moving rapidly in the axial direction and capable

of being coupled to the output shaft so that relative movement does not occur; and

a fluid pressure mechanism, provided between the output shaft and the input shaft, for, when the input shaft and the output shaft move relatively, increasing a thrust force of the input shaft by means of Pascal's principle and transmitting it to the output shaft,

capable of effecting rapid movement of the output shaft by coupling the input shaft to the output shaft so that relative movement does not occur and moving and effecting high thrust force pressurization of the output shaft by releasing said coupling and allowing the input shaft to move relative to the output shaft,

characterized in that a motive power source of a switching mechanism for switching from the rapid movement to the high thrust force pressurization is mounted outside the fixed part.

9. A pressurizing device according to claim 8, characterized in that the motive power source is mounted on the output shaft.